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(54) GATE VALVES

(71) I, ROBERT JULIEN JOSEPH GUICHON, a French subject of 1, rue de la Republique, Aix Les Bains (Savoie), France, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to gate valves.

Gate valves may be used with conveyor pipes for conveying products at high temperature, and in particular products developing a deposit such as cracking gas of petroleums which deposits coke under the action of the high temperature. Most of the presently known valves do not give satisfaction because their seatings are not protected in the open position so that they become unusable after opening.

According to the invention a gate valve comprises a body having an inlet and an outlet, a valve member mounted for sliding movement between a first position in which the valve member prevents communication between the inlet and the outlet and a second position in which an opening in the valve member permits communication between the inlet and the outlet, a movable wedge for pressing the valve member against a seating in both said positions, the wedge having an opening which cooperates with the valve member opening to permit said communication in the second position, the wedge and the valve member being connected to independent members for separately controlling their displacement.

According to one preferred embodiment of the invention the valve or closing member is associated with a wedge for pressing the closing member against its seating, said closing member being provided with an extension in which there is provided an opening for the products conveyed so that in the open position of the valve, due to sliding displacement of the closing member, this opening is situated between the inlet and the outlet orifices of the valve, the aforesaid wedge having itself an identical orifice so that it can be applied against the closing member when the latter is in the open position as well as when it is in the closed position. Thus in the closed position of the valve its seating is protected by the closing member as well as by the wedge and in the open position its seating is protected by the extension of the closing member and by the wedge. The wedge and the closing member are connected in vertical translation to independent members for controlling their vertical displacement, and permitting unwedging and rewedging of the closing member respectively before and after each displacement. In the case of its application to the conveying of products or gases at high temperature coming from a distillation column utilising the process called "Steam-Cracking" or from any other furnace, the closing member comprises in a preferred embodiment in its part ensuring the closure of the inlet orifice of the valve, a blind central bore which, with longitudinal axis parallel to the direction of flow of the products, communicates with a seating made in the said closing member and leading laterally from the latter to an additional outlet tube provided in the body of the valve in order to permit the evacuation of products resulting from the decoking of the distillation column or furnace without opening the valve. Due to this arrangement, decoking of an installation disposed above the valve may be effected in that it is unnecessary to open the valve and consequently without it being necessary to stop the installation. In addition the ability to effect the decoking without opening the valve permits the decoking to be carried out at much higher temperatures than in the past, which temperatures were limited by the possibilities of installations disposed below. This advantage is very important because it permits effecting the operation of decoking without waiting until the furnace or the distillation column is stopped. Therefore the losses of time are considerably reduced and an increase in the output of the assembly is ensured.

Advantageously the closing member is mounted with lateral play in the body of the valve and carries on one of its lateral faces an inclined surface which at the end of the closing stroke and in combination with an

oppositely inclined surface inserted in the body of the valve, places the other lateral face of the said closing member against a seating made at the inner end of a additional outlet tube for the decoked products.

Embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Fig. 1 is a part-sectional perspective view showing a first embodiment of the valve;

Fig. 2 is a cross-section of part of the valve of Fig. 1, more particularly a closing or valve member in the closed position; and

Figs 3 and 4 are sectional views taken respectively on lines 3-3 and 4-4 of Figs. 4 and 3, showing, on an enlarged scale, another embodiment of the invention.

The valve shown in Fig. 1 is essentially constituted by a tubular body 2 of rectangular section and having on two of its opposite lateral walls two tubes 3 and 4 respectively having inlet and outlet openings 3*a* and 4*a*.

Inside the tubular body 2 of the valve there is disposed a vertically disposed closure member 5. Beyond its part ensuring the closure of the inlet opening 3*a*, there is an extension 5*a* in which is made a bore 6 of equal diameter to the inlet orifice 3*a* in the tube 3. The member 5 is connected for vertical movement to a rod 7 capable of being reciprocatably displaced vertically by any known means.

In addition, the member 5 is associated with a wedge 8 having a vertical flat face 8*a* disposed adjacent one face of the member 5, and an inclined face 8*b* which, having a steep slope, is supported in the closed position of the valve, against a seating 9 made in the body of the valve. This wedge is provided with a cylindrical bore 10 of diameter equal to that of the inlet and outlet orifices of the valve. Finally the wedge 8 is connected for vertical movement to an operating rod 12 capable of being reciprocatably displaced vertically.

Thus, when the valve is in the closed position, as shown in Fig. 2, in order to bring it to its open position it suffices firstly to displace the wedge in the direction of the arrow 13 of Fig. 2 then, secondly to displace the member 5 in the same direction. The member 5 may then slide freely until the bore 6 of its extension 5*a* is coaxial with the inlet and outlet orifices 3*a* and 4*a* of the valve. When the valve is in the open position the control rod 12 of the wedge 8 is then operated in order that this wedge may be displaced in the opposite direction to the arrow 13 and be supported against the seating 9 to place the extension 5*a* of the cover against a seating 14 provided at the inner end of the tube 3.

Of course, in order to bring the member 5 from its open position to its closed position shown in Fig. 2 it suffices to proceed in the opposite manner, that is to say, to unlock the wedge 8, displace the cover 5, and then finally relock the member 5 by means of the wedge 8.

Thus, whether the member 5 is in the open or closed position, it is always kept in contact with the seating 14 so that any risk of soiling of the seating is obviated.

In addition, the member 5 and the wedge 8 have on their faces adjacent their seatings, radial grooves, not shown in Figs. 1 and 2, intended to permit cleaning of the corresponding seatings by steam under pressure which is led into the tubular body 2 and which is evacuated through the outlet tube 4. This steam prevents any carbonaceous or tary particles from being or remaining deposited on any of the seatings or on the member 5 or the wedge and thus avoids any trouble or operating accidents ensuing from deposition of such particles.

In another embodiment shown in Figs. 3 and 4, in which like parts to those in Figs. 1 and 2 have like reference numerals, the member 5 has in its part providing the closing of the valve a truncated blind bore 15 which, coaxial with the inlet and outlet openings 3*a* and 4*a*, leads into a blind seating 16. This seating 16 extends laterally and emerges on one side edge of the member 5 adjacent an outlet tube 17 made in the corresponding wall of the tubular body 2.

As Fig. 4 shows more particularly, the side edge of the member 5, opposite that coming in contact with a seating 17*a* made at the inner end of the tube 17, comprises an inclined plane or wedge 18. In addition, the tubular body 2 has on its inner face adjacent the wedge 18 an inclined slope 19 which has an inclination opposite to that of the wedge 18.

Finally as shown in Fig. 4 the member 5 has lateral guide clips 20 which are spaced slightly from the corresponding inner walls of the tubular body 2 in order to allow the member 5 a certain lateral play *J*.

Thus, when the member 5, is displaced in the direction of the arrow 21 in Fig. 4 to be brought into the closed position, so that the wedge 18 enters in contact with the inclined face 19, this latter communicates to it a transverse displacement in the direction of the arrow 22 and applies it with water-tight contact against the seating 17*a* of the outlet 17. At the end of this movement the seating 16 is directly in line with the outlet tube 17 as shown in Fig. 4.

Of course in order to ensure the complete water-tightness of the valve it is necessary to displace the wedge 8 in the direction of the arrow 21 in order to place the member 5 against the seating 14 as shown in Fig. 3.

The valve thus realised of the direct three-way type is particularly useful when it is used

for the conveying of products coming from a distillation column or a furnace. In fact, when it is in the position shown in Figs. 3 and 4, that is to say where outlet 4 is isolated from the inlet 3, it can be adapted to evacuate the products coming from de-coking of an installation below which it is disposed. The de-coking products entering the valve through the inlet tube 3 pass directly through the bore 15 and seating 16 to be evacuated through the tube 17.

This arrangement of the valve is particularly suitable as it permits de-coking with the valve in the position shown, whilst in the past it has been necessary to leave the valve in the position where outlet 4 is open to inlet 3 which made it necessary to stop the installation completely before carrying out the de-coking. With the described valve therefore, it is not necessary to stop the distillation column for a long time, of the order of three to four days. In fact a reduction of the temperature in the distillation column or in the furnace, which only requires a few hours, is sufficient. Such a valve therefore, permitting the considerable reduction of the stopping time necessary for de-coking of the installation on which it is installed, consequently provides a considerable increase in the output of the installation.

As Figs. 3 and 4 show more particularly the tubular body 2 is surmounted by a box 26 having cooling vanes 27 and an inlet tube 28 which is connected to a steam system under pressure. At its upper part, the box 26 has seatings 29 for the stuffing boxes intended to ensure a water-tightness for the passage of the control rods 7 and 12 respectively of the member 5 and the wedge 8. In known manner these two rods are connected to means for imparting to them vertical movement.

Thus, when the steam penetrates into the inner cavity of the box 26 it is led into the tubular body 2 via the openings 30 made in the connecting flanges of the box 26 and the tubular body 2, and thus passes into the tubular body 2 to come into contact with the member 5 and the wedge 8 which have, as shown more particularly in Fig. 3, radial grooves 32. Due to these grooves 32, the steam infiltrates between the abutting faces of the two aforementioned elements and their respective seatings, and prevents any deposits on these faces.

Finally the tubular body 2 has at its lower part a removable box 33 intended to receive the products of decoking or the carbonaceous and tarry particles which would not be evacuated normally through one of the outlet tubes 4 or 17. The box 33 may be removed from the tubular body 2 so as to be emptied of the deposits which it contains and this can be done when the valve is in the open or closed position.

WHAT I CLAIM IS:—

1. A gate valve comprising a body having an inlet and an outlet, a valve member mounted for sliding movement between a first position in which the valve member prevents communication between the inlet and the outlet and a second position in which an opening in the valve member permits communication between the inlet and the outlet, a movable wedge for pressing the valve member against a seating in both said positions, the wedge having an opening which cooperates with the valve member opening to permit said communication in the second position, the wedge and the valve member being connected to independent members for separately controlling their displacement.

2. A gate valve according to Claim 1, including a central blind bore in a part of the valve member not including the opening, which, in the second valve member position, communicates with the inlet and, via a lateral bore portion, a further outlet in the body of the valve.

3. A gate valve according to Claim 2, in which the valve member is mounted with lateral play in the valve body and is provided on a side face with a first inclined ramp which at the end of the movement from the first to the second position cooperates with a second ramp of the vehicle body and inclined in the opposite sense to the first ramp to urge the valve member against a seating at the inner end of the further outlet in the valve body.

4. A gate valve substantially as hereinbefore described with reference to and as illustrated in Figs. 1 and 2, or Figs. 3 and 4, of the accompanying drawings.

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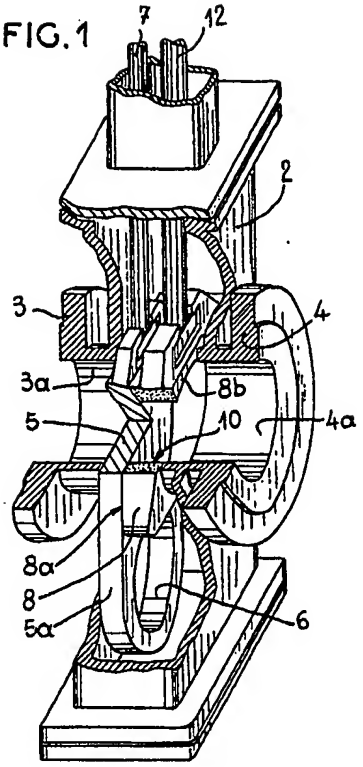
Sheet 1

FIG. 1



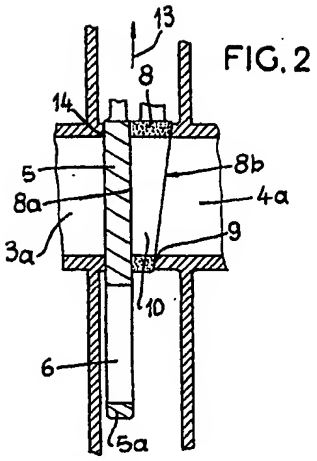


FIG. 2

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Sheet 2

FIG.4

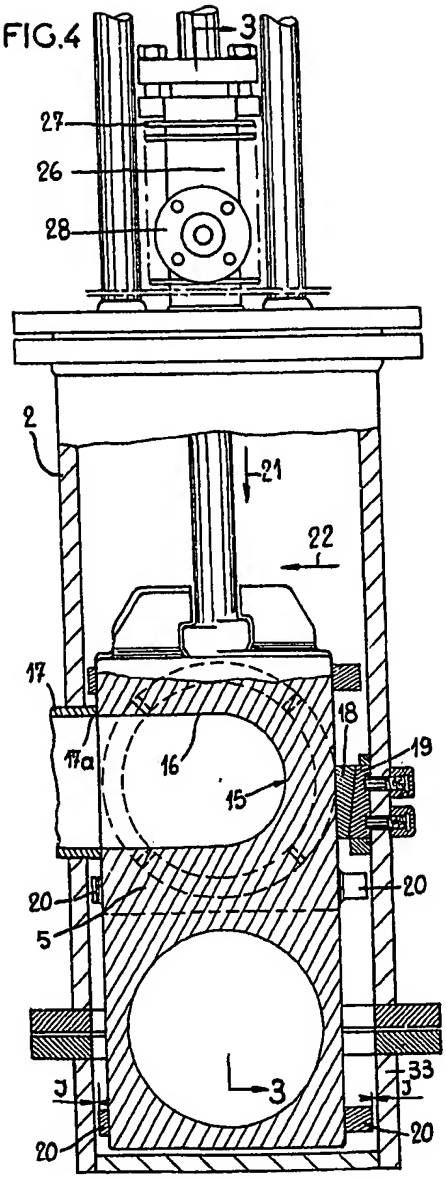

FIG.3